WHAT IS CLAIMED IS:

1. A method for representation, interpolation and/or compression of data, the method comprising:

identifying a two-dimensional interpolation function *s(z)* based on a sampling function *a(z)*, a Cauchy integral theorem being applicable for the interpolation function s(z); and

using the interpolation function *s(z)* for at least one of representation, interpolation and compression of the data.

2. The method as recited in claim 1 wherein a residue theorem is applicable for the interpolation function s(z).

3. The method as recited in claim 1 wherein the sampling function *a(z)* is a function over the complex numbers for which *a(0)* =1 and at at least all other sampled values z_j to be considered is equal to zero.

4. The method as recited in claim 3 wherein the interpolation function *s(z)* can be represented by

$$s(z) = \Sigma s_j\, a(z-z_j)$$

wherein *s(z)* is capable of being represented by the function values s_j at the complex sampling points z_j.

5. The method as recited in claim 1 wherein the sampling function *a(z)* is constructed using at least one of a double-periodic and a quasi-double periodic complex function.

6. The method as recited in claim 1 wherein the sampling function *a(z)* is a complex holomorphic function.

7. The method as recited in claim 6 wherein the sampling function *a(z)* is a complex

holomorphic function except at existing poles.

8. The method as recited in claim 1 wherein sampled values of the interpolation function $s(z)$ are located within a closed curve C.

9. The method as recited in claim 1 wherein function values of the interpolation function $s(z)$ for points on a curve C are determined by an equation $s(z) = \Sigma s_j a(z-z_j)$.

10. The method as recited in claim 9 wherein the curve C is a closed curve and wherein function values on the curve C are parameterized using a path length so as to obtain an equivalent one-dimensional data set.

11. The method as recited in claim 10 wherein points of interpolation function $s(z)$ within the curve C are determined by function values on the curve C using the Cauchy integral theorem and, if poles are present, using the residue theorem.

12. The method as recited in claim 1 wherein the sampling function $a(z)$ satisfies

$$a(z)=sl\left(\overline{\pi}z\right)/\left(\overline{\pi}z\right)$$

13. The method as recited in claim 12 wherein $sl(z)$ is a Sinus Lemniscatus, the Sinus Lemniscatus being an elliptic function which can be represented using Jacobian elliptic functions.

14. The method as recited in claim 1 wherein the using the interpolation function for the compression of the data is performed by mapping the data is mapped onto points within a curve C and representing the data by points on a closed boundary curve, the representing being performed using the interpolation function $s(z)$.

15. The method as recited in claim 14 wherein the mapping the data onto points within the curve C is performed on a line-by-line basis.

16. The method as recited in claim 2 wherein the using the interpolation function for the compression of the data is performed by mapping the data is mapped onto points within a curve *C* and representing the data by points on a closed boundary curve, the representing being performed using the interpolation function *s(z)*.

17. The method as recited in claim 1 wherein the data is automatically processable.

18. A computer readable medium having stored thereon computer executable process steps operative to perform a method for representation, interpolation and/or compression of data, the method comprising:

identifying a two-dimensional interpolation function *s(z)* based on a sampling function *a(z)*, a Cauchy integral theorem being applicable for the interpolation function s(z);

using the interpolation function *s(z)* for at least one of representation, interpolation and compression of the data.

19. A computer system comprising a processor configured to execute computer executable process steps operative to perform a method for representation, interpolation and/or compression of data, the method comprising:

identifying a two-dimensional interpolation function *s(z)* based on a sampling function *a(z)*, a Cauchy integral theorem being applicable for the interpolation function s(z);

using the interpolation function *s(z)* for at least one of representation, interpolation and compression of the data.